The invention in which an exclusive right is claimed is defined by the following:

1. An automated reaction system for continuously performing a plurality of optimization experiments to enable at least one optimal reaction parameter for a reaction to be identified, the reaction producing a desired product, comprising:

(a) a controller, said controller being configured to monitor and control the system while performing optimization experiments;

(b) a reactant supply source for each reactant required for the reaction;

(c) a solvent supply source coupled in fluid communication with each reactant supply source;

(d) a dilution pump for each reactant, each dilution pump being coupled in fluid communication with a corresponding reactant supply source and with the solvent supply source for a corresponding reactant, and being logically coupled to the controller and operative to vary a concentration of a corresponding reactant using a solvent;

(e) a reaction module having an inlet coupled in fluid communication with each reactant supply source and the solvent supply source to receive each reactant, and an outlet, the reaction module being operative to initiate the reaction of the reactants; and

(f) at least one analytical unit coupled in fluid communication with the outlet and logically coupled with the controller, the analytical unit being configured to analyze the desired product, producing data for the plurality of optimization experiments used to determine at least one optimal reaction parameter.

2. The automated reaction system of Claim 1, further comprising a reactant pump for each reactant required for the reaction, each reactant pump being logically coupled to the controller and operative to provide a flow of a corresponding reactant to the inlet of the reaction module.

3. The automated reaction system of Claim 1, further comprising at a plurality of residence time chambers, each resident time chamber being configured to be coupled in fluid communication between the outlet of the reaction module and the analytical unit.

4. The automated reaction system of Claim 3, wherein the controller carries out a plurality of functions, including:

(a) directing a flow of fluid from the outlet of the reaction module sequentially into each of the plurality of residence time chambers;

(b) directing a flow of fluid from the outlet of a last of the plurality of residence time chambers, which is last to sequentially receive the flow of fluid from the outlet, into the analytical unit;

(c) obtaining data from the analytical unit for a fluid exiting the last residence time chamber; and

(d) after data have been obtained from the analytical unit for the fluid exiting the last of the plurality of residence time chambers, carrying out a further plurality of functions, including:

(i) isolating the last of the plurality of residence time chambers from the analytical unit;

(ii) directing a flow of fluid from the outlet of a preceding residence time chamber into the analytical unit; and

(iii) obtaining data from the analytical unit for a fluid exiting the preceding residence time chamber.

5. The automated reaction system of Claim 4, wherein the plurality of functions carried out by the controller include directing a flow of fluid from the outlet of the reaction module into the analytical unit, such that such that data corresponding to the flow of fluid from the outlet of the reaction module is collected.

6. The automated reaction system of Claim 1, further comprising a heat exchanger configured to thermally condition each reactant entering the reaction module, the heat exchanger being logically coupled to and controlled by the controller.

7. The automated reaction system of Claim 6, wherein the controller controls a flow of a temperature conditioned fluid through the heat exchanger to vary a thermal condition in the reaction module over time, such that the analytical unit collects data corresponding to a plurality of different thermal conditions in the reaction module, to determine an optimal thermal condition for the reaction.

8. The automated reaction system of Claim 1, wherein the controller controls each dilution pump to vary a concentration of each reactant over time, such that the analytical unit collects data corresponding to a plurality of concentrations of each reactant, to enable an optimal concentration of each reactant to be identified for the reaction.

9. The automated reaction system of Claim 1, wherein the controller controls a plurality of reaction parameters according to a periodic pattern, such that the analytical unit collects data corresponding to a plurality of values for each reaction parameter, to determine an optimal value for each reactant parameter.

10. The automated reaction system of Claim 9, wherein the controller varies the predefined pattern based on the data produced by the analytical unit.

11. The automated reaction system of Claim 9, wherein the controller simultaneously varies at least two reaction parameters based on a periodic function.

12. The automated reaction system of Claim 11, wherein each of the at least two reaction parameters are varied by the controller according to different periodic functions.

13. The automated reaction system of Claim 12, wherein the controller further:

(a) evaluates the data produced by the analytical unit after each of the at least two reaction parameters are varied according to their respective periodic functions;

(b) identifies new upper and lower boundaries for at least one of the at least two reaction parameters;

(c) based on the new upper and lower boundaries, redefines at least one periodic function; and

(d) simultaneously varies each of the at least two reaction parameters based on the periodic functions, using each that has been redefined.

14. A method for using a continuously running system to determine at least one optimal reaction parameter for a reaction to produce a desired product, comprising the steps of:

(a) identifying at least one reaction parameter to be varied;

(b) for each reaction parameter, identifying a plurality of values to be assigned to the reaction parameter;

(c) selecting a baseline value for each reaction parameters from the plurality of values identified for each reaction parameter;

(d) using the baseline values to generate the desired product in a continuously running reaction system;

(e) determining at least one of a quantity and a quality of the desired product generated using the baseline values;

(f) changing the baseline value for at least one reaction parameter, thereby affecting the desired product being produced by the continuously running system;

(g) determining at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed; and

(h) comparing the at least one of the quantity and the quality of the desired product generated before changing the at least one of the baseline value with a corresponding at least one of the quantity and the quality of the desired product generated after the step of changing, to determine the at least one reaction parameter responsible for generating the highest of at least one of the quantity and the quality of the desired product.

15. The method of Claim 14, wherein the plurality of values for each reaction parameter correspond to upper and lower boundaries.

16. The method of Claim 15, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least two reaction parameters according to a periodic function, wherein each of the at least two reaction parameters are changed based on different periodic functions.

17. The method of Claim 16, further comprising the step of determining if data corresponding to at least one of a quantity and a quality of the desired product generated in the continuously running system operated with the at least two reaction parameters that are changed based on different periodic functions indicates that any ranges for the plurality of values for each reaction parameter should be changed, and if so, changing the range as indicated by such data.

18. The method of Claim 14, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a linear function.

19. The method of Claim 14, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a predefined pattern.

20. The method of Claim 14, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a user input.

21. A method for using a continuously running reaction optimization system to determine at least one optimal reaction parameter for a reaction to produce a desired product, comprising the steps of:

(a) identifying at least one reaction parameter to be varied;

(b) identifying a baseline value for each reaction parameter;

(c) using the baseline values to generate the desired product in a continuously running reaction optimization system;

(d) determining at least one of a quantity and a quality of the desired product generated using the baseline values;

(e) changing the baseline value for at least one reaction parameter, thereby affecting the desired product being produced by the continuously running system;

(f) determining at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed; and

(g) comparing the at least one of the quantity and the quality of the desired product generated before changing the at least one of the baseline value with a corresponding at least one of the quantity and the quality of the desired product generated after the step of changing, to determine the at least one reaction parameter responsible for generating the highest of at least one of the quantity and the quality of the desired product.

22. The method of Claim 21, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least two reaction parameters according to a periodic function, wherein each of the at least two reaction parameters are changed based on different periodic functions.

23. The method of Claim 21, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a linear function.

24. The method of Claim 23, further comprising the step of determining if data corresponding to at least one of a quantity and a quality of the desired product generated in the continuously running system operated with at least one reaction parameter being changed according to a linear function indicates any values corresponding to a linear discontinuity, and if so:

(a) for each value corresponding to a linear discontinuity, defining that value as a baseline value; and

(b) repeating steps (c)-(g).

25. The method of Claim 21, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a user input.

26. The method of Claim 21, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a predefined pattern.

27. A method for using a continuously running reaction optimization system to generate data that can be used to identify at least one optimal reaction parameter for a reaction to produce a desired product, comprising the steps of:

(a) identifying at least one reaction parameter to be varied;

(b) identifying a baseline value for each reaction parameter;

(c) using the baseline values to generate the desired product in a continuously running reaction optimization system;

(d) determining at least one of a quantity and a quality of the desired product generated using the baseline values;

(e) changing the baseline value for at least one reaction parameter, thereby effecting the desired product being produced by the continuously running system; and

(f) determining at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed.

28. The method of Claim 27, further comprising the step of comparing the at least one of the quantity and the quality of the desired product generated before changing the at least one of the baseline value with a corresponding at least one of the quantity and the quality of the desired product generated after the step of changing, to determine the at least one reaction parameter responsible for generating the highest of at least one of the quantity and the quality of the desired product.

29. The method of Claim 27, wherein the step of changing the baseline value for at least one reaction parameter comprises at least one of the steps of:

(a) changing the baseline value for at least one reaction parameter according to a predefined pattern;

(b) changing the baseline value for at least one reaction parameter according to a periodic function;

(c) changing the baseline value for at least one reaction parameter according to a linear function; and

(d) changing the baseline value for at least one reaction parameter according to a user input.

30. A method for using a continuously running reaction optimization system to generate data that can be used to identify at least one optimal reaction parameter for a reaction to produce a desired product, comprising the steps of:

(a) identifying at least one reaction parameter to be varied;

(b) identifying a baseline value for each reaction parameter;

(c) using the baseline values to generate the desired product in a continuously running reaction optimization system, such that data corresponding

to at least one of a quantity and a quality of the desired product generated using the baseline values is collected; and

(d) changing the baseline value for at least one reaction parameter over time, thereby effecting the desired product being produced by the continuously running system, such that data corresponding to at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed is collected over time.

31. The method of Claim 30, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a predefined pattern.

32. The method of Claim 30, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a periodic function.

33. The method of Claim 30, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a linear function.

34. The method of Claim 30, wherein the step of changing the baseline value for at least one reaction parameter comprises the step of changing the baseline value for at least one reaction parameter according to a user input.